Proposed Registration Decision PRD2016-28

Phoma macrostoma strain 94-44B

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Overview

Proposed Registration Decision for *Phoma macrostoma* strain 94-44B

Health Canada's Pest Management Regulatory Agency (PMRA), under the authority of the *Pest Control Products Act* and Regulations, is proposing full registration for the sale and use of Bio-Phoma Technical Herbicide, the manufacturing concentrate, Bio-Phoma Manufacturing Concentrate, as well as three associated end-use products: Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma Commercial, containing the technical grade active ingredient *Phoma macrostoma* strain 94-44B, to control a broad spectrum of broadleaf weeds in established turfgrass and new seeding of grasses and in field grown nursery and ornamental plants and trees and container grown ornamentals.

These listed products are conditionally registered in Canada:

Current Product Name	Registration Number	Previously Named
Bio-Phoma Technical Herbicide	30133	Scotts EcoSense Weed-B-Gon Technical Bio-Herbicide
Bio-Phoma Manufacturing Concentrate	30135	Scotts EcoSense Weed-B-Gon Manufacturing Use Concentrate
Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide	30132	Scotts EcoSense Weed-B-Gon Ready To Use Lawn Weed Control Herbicide
Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide	30134	Scotts EcoSense Weed-B-Gon Ready To Use Lawn Weed Control
Wilson Lawn WeedOut Bio-Phoma Commercial	30136	Scotts Phoma P Commercial

The detailed original review of the human health, environmental and value assessments for these products can be found in the Evaluation Report ERC2011-09, *Phoma macrostoma* strain 94-44B. The current applications were submitted to convert these listed products from conditional registration to full registration.

An evaluation of available scientific information found that, under the approved conditions of use, the product has value and does not present an unacceptable risk to human health or the environment.

This Overview describes the key points of the evaluation, while the Science Evaluation provides detailed technical information on the confirmatory information submitted in support of the chemistry and value assessments of Bio-Phoma Technical Herbicide, Bio-Phoma Manufacturing Concentrate, Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma Commercial.

What Does Health Canada Consider When Making a Registration Decision?

The key objective of the *Pest Control Products Act* is to prevent unacceptable risks to people and the environment from the use of pest control products. Health or environmental risk is considered acceptable[1] if there is reasonable certainty that no harm to human health, future generations or the environment will result from use or exposure to the product under its proposed conditions of registration. The Act also requires that products have value[2] when used according to the label directions. Conditions of registration may include special precautionary measures on the product label to further reduce risk.

To reach its decisions, the PMRA applies modern, rigorous risk-assessment methods and policies. These methods consider the unique characteristics of sensitive subpopulations in humans (for example, children) as well as organisms in the environment. These methods and policies also consider the nature of the effects observed and the uncertainties when predicting the impact of pesticides. For more information on how the PMRA regulates pesticides, the assessment process and risk-reduction programs, please visit the Pesticides and Pest Management portion of Health Canada's website at healthcanada.gc.ca/pmra.

Before making a final registration decision on *Phoma macrostoma* strain 94-44B, the PMRA will consider any comments received from the public in response to this consultation document[3]. The PMRA will then publish a Registration Decision[4] on *Phoma macrostoma* strain 94-44B, which will include the decision, the reasons for it, a summary of comments received on the proposed final registration decision and the PMRA's response to these comments.

For more details on the information presented in this Overview, please refer to the Science Evaluation of this consultation document.

What Is *Phoma macrostoma* strain 94-44B?

Phoma macrostoma strain 94-44B is a fungus that was isolated from Canada thistle plants in Alberta, Saskatchewan, Ontario, Nova Scotia, and New Brunswick. In its natural environment, *Phoma macrostoma* has a broad host range and a worldwide distribution. Many of the different *Phoma macrostoma* isolates do not possess herbicidal properties; only isolates from Canada thistle show this biological trait.

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1 "Acceptable risks" as defined by subsection 2(2) of the *Pest Control Products Act*.

2 "Value" as defined by subsection 2(1) of the *Pest Control Products Act*: "... the product's actual or potential contribution to pest management, taking into account its conditions or proposed conditions of registration, and includes the product's (*a*) efficacy; (*b*) effect on host organisms in connection with which it is intended to be used; and (*c*) health, safety and environmental benefits and social and economic impact."

3 "Consultation statement" as required by subsection 28(2) of the *Pest Control Products Act*.

4 "Decision statement" as required by subsection 28(5) of the *Pest Control Products Act*.

When *Phoma macrostoma* strain 94-44B is applied to the soil, it colonizes roots of both susceptible and tolerant hosts but symptoms are only expressed in susceptible hosts. The susceptible plants turn to yellow or white and then die or seedlings fail to emerge.

Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide and Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide, both domestic class products, and Wilson Lawn WeedOut Bio-Phoma Commercial, a commercial class product, have identical formulations.

Health Considerations

Can Approved Uses of *Phoma macrostoma* strain 94-44B Affect Human Health?

***Phoma macrostoma* strain 94-44B is unlikely to affect your health when Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma Commercial are used according to the label directions.**

People could be exposed to *Phoma macrostoma* strain 94-44B when handling and applying the products. When assessing health risks, several key factors are considered:

- the microorganism's biological properties (for example, production of toxic by-products);
- reports of any adverse incidents;
- its potential to cause disease or toxicity as determined in toxicological studies; and
- the level to which people may be exposed relative to exposures already encountered in nature to other isolates of this microorganism.

Toxicological studies in laboratory animals describe potential health effects from large doses in order to identify any potential pathogenicity, infectivity and toxicity concerns. When *Phoma macrostoma* strain 94-44B, the technical grade of active ingredient, as well as the granular formulations containing *Phoma macrostoma* strain 94-44B, were tested on laboratory animals, there were no signs that it caused any significant toxicity or disease.

Residues in Water and Food

Dietary risks from food and water are not of concern

As part of the assessment process prior to the registration of a pesticide, Health Canada must determine whether the consumption of the maximum amount of residues, that are expected to remain on food products when a pesticide is used according to label directions, will not be a concern to human health. This maximum amount of residues expected is then legally specified as a maximum residue limit (MRL) under the *Pest Control Products Act* for the purposes of the adulteration provision of the *Food and Drugs Act*. Health Canada specifies science-based MRLs to ensure that the food Canadians eat is safe.

As there are no direct applications to food, there is no concern for risks posed by dietary exposure of the general population, including infants and children, or animals to *Phoma macrostoma* strain 94-44B.

Risks in Residential and Other Non-Occupational Environments

Estimated risk for non-occupational exposure is not of concern.

The end-use products containing *Phoma macrostoma* strain 94-44B are for use on turf, in field grown nursery and landscape ornamentals and in container grown ornamentals. The application directions on the product labels include statements to minimize drift. Consequently, it is unlikely that adults, youths and toddlers will be exposed to *Phoma macrostoma* strain 94-44B. Even in the event of exposure, risk to the general population is not a concern since there were no signs of disease or toxicity noted in toxicological studies with this microorganism.

Users of the domestic end-use products containing *Phoma macrostoma* strain 94-44B can come in direct contact with the end-use products when handling and applying ready-to-use products to turf, and during any clean-ups and repairs. Because of the toxicity profiles of *Phoma macrostoma* strain 94-44B and the end-use products, the methods of application, and the use pattern, risks to users of domestic end-use products are not expected to be of concern when the products are applied according to label directions.

Occupational Risks From Handling Products Containing *Phoma macrostoma* strain 94-44B

Occupational risks are not of concern when the commercial end-use product containing *Phoma macrostoma* strain 94-44B is used according to label directions, which include protective measures

Workers handling Wilson Lawn WeedOut Bio-Phoma Commercial can come into direct contact with *Phoma macrostoma* strain 94-44B on the skin, in the eyes or by inhalation. For this reason, the product label will specify that workers exposed to Wilson Lawn WeedOut Bio-Phoma Commercial must wear waterproof gloves, eye goggles, long-sleeved shirts, long pants, a NIOSH approved mist filtering mask or respirator, and shoes plus socks.

Environmental Considerations

What Happens When Products Containing *Phoma macrostoma* strain 94-44B Are Introduced Into the Environment?

Products containing *Phoma macrostoma* strain 94-44B are not expected to pose risks of concern to the environment when used according to label directions.

Following application, *Phoma macrostoma* strain 94-44B is likely able to survive in the soil under suitable environmental conditions (in other words, temperature, moisture), but over time populations of *Phoma macrostoma* strain 94-44B are expected to return to natural levels.

In aquatic environments, *Phoma macrostoma* is not expected to persist long as it is not considered an aquatic fungus. The end-use products, Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma Commercial are not intended for aquatic use and exposure to aquatic environments from drift and run-off (following a rain event) from field application is unlikely to be significant.

Based on results of laboratory studies with *Phoma macrostoma* strain 94-44B and a critical review of information in the published scientific literature, no significant effects to birds, wild mammals, aquatic and terrestrial arthropods, non-arthropod invertebrates and fish are expected when Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma Commercial are applied according to directions on the label.

Value Considerations

What Is the Value of End-Use Products Containing *Phoma macrostoma* strain 94-44B?

The Wilson Lawn WeedOut end-use products containing *Phoma macrostoma* strain 94-44, a pre- and post-emergent bio-herbicide, provide control or suppression of broadleaved weeds in seedling and established turfgrass as well as in nursery crops and ornamental plants and trees.

A single pre-emergence application of *Phoma macrostoma* strain 94-44B containing end-use products provides control or suppression of numerous broadleaved weeds, including common groundsel, dandelion, scentless chamomile, wild mustard, broadleaf plantain, English daisy, white clover, Canada thistle, black medic, chickweed, and common ragweed.

Two to three post-emergence applications of *Phoma macrostoma* strain 94-44B containing end-use products provides control or suppression of white clover, black medic, dandelion, Canada thistle, and broadleaf plantain.

Phoma macrostoma strain 94-44B is classified as a non-conventional herbicide and as such, it represents an alternative product for weed management in turfgrass, nursery, and ornamentals, especially in situations where the use of conventional herbicides is not desirable.

Measures to Minimize Risk

Labels of registered pesticide products include specific instructions for use. Directions include risk-reduction measures to protect human and environmental health. These directions must be followed by law.

The key risk-reduction measures being proposed on the label of Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma Commercial to address the potential risks identified in this assessment are as follows.

Key Risk-Reduction Measures

Human Health

All microorganisms, including *Phoma macrostoma* strain 94-44B, contain substances that are potential sensitizers and thus, respiratory and dermal sensitivity may possibly develop in individuals exposed repeatedly to potentially large quantities of *Phoma macrostoma* strain 94-44B. In turn, anyone handling or applying Wilson Lawn WeedOut Bio-Phoma Commercial must wear appropriate waterproof gloves, eye goggles, a long-sleeved shirt, long pants, a NIOSH approved mist filtering mask or respirator, and shoes plus socks.

Environment

The end-use product labels include environmental precautionary statements that prevent the contamination of aquatic systems from the use of Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma Commercial as well as precautionary statements warning users to avoid contact with desirable plants, fruits and vegetables.

Next Steps

Before making a final registration decision on *Phoma macrostoma* strain 94-44B, the PMRA will consider any comments received from the public in response to this consultation document. The PMRA will accept written comments on this proposal up to 45 days from the date of publication of this document. Please forward all comments to Publications (contact information on the cover page of this document). The PMRA will then publish a Registration Decision, which will include its decision, the reasons for it, a summary of comments received on the proposed final decision and the Agency's response to these comments.

Other Information

When the PMRA makes its registration decision, it will publish a Registration Decision on *Phoma macrostoma* strain 94-44B (based on the Science Evaluation section of this consultation document). In addition, the test data referenced in this consultation document will be available for public inspection, upon application, in the PMRA's Reading Room (located in Ottawa).

Science Evaluation

Phoma macrostoma strain 94-44B

The detailed review for *Phoma macrostoma* strain 94-44B and its associated end-use products can be found in the Evaluation Report ERC2011-09, *Phoma macrostoma* strain 94-44B.

1.0 The Active Ingredient, Its Properties and Uses

For information on the active ingredient and end-use product properties, please refer to ERC2011-09

1.1 Directions for Use

The Wilson Lawn WeedOut end-use products contain a living fungus, *Phoma macrostoma* strain 94-44B, and their efficacy, therefore, is maximized when applied on moist soil or where rainfall or irrigation occurs within 24 to 72 hours after application and temperature is between 15 and 30°C in the day.

A single pre-emergent application (pre-emergence to weeds and pre- or post-emergence to host) of Wilson Lawn WeedOut Bio-Phoma Commercial and Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide at a rate of 16 g per m^2 provides control of broadleaf plantain, dandelion, scentless chamomile, English daisy, wild mustard, and common groundsel and suppression of white clover, Canada thistle, black medic, chickweed (partial), and common ragweed (partial). Two to three post-emergent applications of these products at a rate of 32 g per m^2 per application provide control of dandelion, white clover, black medic, and Canada thistle and suppression of broadleaf plantain. Wilson Lawn WeedOut Bio-Phoma Commercial can be used around established landscape and field grown and container ornamental plants while Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide can be used on newly planted and established turfgrass.

Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide, designed as a spot treatment, can be applied post-emergence at a rate of 2 g per weed to cover an area of 20 cm in diameter. Two to three applications provide control of dandelion, white clover, black medic, and Canada thistle and suppression of broadleaf plantain on newly planted and established turfgrass.

1.2 Mode of Action

When the Wilson Lawn WeedOut end-use products are applied to the soil, *P. macrostoma* strain 94-44B colonizes roots of both susceptible and tolerant hosts but symptoms are only expressed in susceptible hosts. The susceptible plants turn to yellow or white and then die or seedlings fail to emerge. The symptoms are the result of phloem mobile metabolites produced by the growing fungus. The metabolites were found to be novel compounds and named as "macrocidins", the first representatives of a new family of cyclic tetramic acids.

It was determined that macrocidins inhibit root growth and cause foliar bleaching. In general, monocotyledonous plants are resistant whereas dicotyledonous plants demonstrate various levels of susceptibility depending on plant species, age, and other factors.

2.0 Methods of Analysis

For a review of the methods used for identification of the microorganisms, establishment of purity of seed stock, to determine and quantify residues (viable or non-viable) of the active microorganism and relevant metabolites, and to determine storage stability as well as shelf-life of the microorganism, please refer to ERC2011-09.

2.1 Methods to Define the Content of the Microorganism in the Manufactured Material Used for the Production of Formulated Products

The guarantees of the technical and end-use products are expressed in units of viable CFU/g. Representative data on six batches of the end-use products were submitted. The method for determining viable spore concentration was adequately described.

2.2 Methods for Determination of Relevant Impurities in the Manufactured Material

The quality assurance procedures used to limit contaminating microorganisms during the manufacture of Bio-Phoma Technical Herbicide and its associated end-use products are acceptable. These procedures include sterilization of all equipment and media as well as frequent sampling of the stock culture and production batches for purity and contamination.

The absence of human pathogens and below-threshold levels of contaminating microorganisms were shown in the microbial screening of batches of the end-use products using standard methods for detecting and enumerating microbial contaminants of concern.

3.0 Impact on Human and Animal Health

For a review of the toxicology of *Phoma macrostoma* strain 94-44B and its associated end-use products, please refer to ERC2011-09.

4.0 Impact on the Environment

For a review of the environmental fate and toxicology of *Phoma macrostoma* strain 94-44B and its associated end-use products, please refer to Evaluation Report ERC2011-09.

5.0 Value

5.1 Consideration of Benefits

Conventional herbicides are not currently available to domestic users in certain jurisdictions where pesticide availability for non-essential or cosmetic uses has been restricted. There are limited options for combating weeds on turfgrass, including home yards, sports fields, parks, school yards, and playgrounds.

In recent years, several non-conventional herbicides have been registered for domestic weed management. Such herbicides include citric acid and lactic acid, corn gluten meal, *Sclerotinia minor*, ammonium soaps of fatty acids, sodium chloride, chelated iron (FeHEDTA), and *Streptomyces acidiscabies*.

Wilson Lawn WeedOut end-use products will provide another option with a different mode of action for control or suppression of broadleaf weeds in turfgrass, nursery crops, and ornamental crops, especially in situations where the use of conventional herbicides is not desirable or available.

Based on the mode of action of *Phoma macrostoma* strain 94-44B, the development of weed resistance to Wilson Lawn WeedOut end-use products is unlikely. The availability of an alternative tool like the Wilson Lawn WeedOut end-use products may reduce the potential for the development of weed resistance to other herbicides registered for the same uses.

5.2 Effectiveness Against Pests

The Wilson Lawn WeedOut end-use products contain a living fungus, *Phoma macrostoma* strain 94-44B, and its efficacy, therefore, is maximized when applied on moist soil or where rainfall or irrigation occurs within 24 to 72 hours after application and temperature is between 15 and 30°C in the day.

Efficacy data were submitted from 79 replicated field and greenhouse trials conducted between 2002 to 2009 at several locations in Alberta, Saskatchewan, New Brunswick, Ontario, Quebec, Nova Scotia, Prince Edward Island, California, and Ohio. The efficacy of a Wilson Lawn WeedOut end-use product was visually assessed as percent weed control for all listed weeds and compared to an untreated check. Observations were made at various times throughout the growing season.

The information submitted is sufficient to support the efficacy claims that are summarized in Table 5.2.1.

Table 5.2.1 Weed Control Claims for Wilson Lawn WeedOut End-Use Products Containing *Phoma macrostoma* stain 94-44B

Timing	Product Rate	Weeds Controlled	Weeds Suppressed
Pre-emergence (1 application)	16 g/m^2	Broadleaf plantain, dandelion, scentless chamomile, common groundsel, wild mustard, and English daisy	White clover, Canada thistle, black medic, chickweed (partial), and common ragweed (partial)
Post-emergence (2-3 applications)	32 g/m^2 per application or 2 g to cover 20 cm in diameter area to treat one weed	white clover and black medic	dandelion, Canada thistle, and broadleaf plantain

5.3 Phytotoxicity to Host Plants

Crop injury to seedling and established turfgrass, including bentgrass, bermudagrass, fine fescue, tall fescue, Kentucky bluegrass, perennial ryegrass, annual ryegrass and mixture of these grasses, was assessed in 69 trials. Some trials included multiple species of grasses and some trials included treatments of a Wilson Lawn WeedOut end-use product applied at the two times, four times, and eight times the maximum rates. Crop injury was visually assessed up to four times during the growing season.

In addition, crop injury to various species of container and field grown ornamental plants was assessed in two dedicated crop tolerance trials conducted in 2009 in Ohio. Both trials included multiple species of ornamental plants and one trial included treatments of a Wilson Lawn WeedOut end-use product at the two times and four times the maximum rates. The plant species included: pot marigold, salvia, Carolina geranium, snapdragon, pansy, coral bells, yarrow, hydrangea, blazing-star, *Rhododendron* x. PJM, *Forsythia* x. intermedia, boxwood, holly, arborvitae, cotoneaster sal., petunia, marigold, alyssum, crimson sage, periwinkle, *Populus* spp., *Picea mariana*, and *Pinus* spp. Crop injury was visually assessed up to four times during the growing season.

The information submitted is sufficient to demonstrate that turfgrass and ornamental plants evaluated can be expected to exhibit an adequate margin of tolerance to the application of Wilson Lawn WeedOut end-use products in accordance with the label instructions.

6.0 Pest Control Product Policy Considerations

For information on *Phoma macrostoma* strain 94-44B and its associated end-use products with respect to the Toxic Substances Management Policy, as well as formulants and contaminants of health or environmental concern, please refer to ERC2011-09.

7.0 Summary

7.1 Methods for Analysis of the Micro-organism as Manufactured

The product characterization data for Bio-Phoma Technical Herbicide, Bio-Phoma Manufacturing Concentrate, Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma commercial were determined to be adequate to assess their potential human health and environmental risks. The technical was characterized and the specifications of the end-use products were supported by the analyses of a sufficient number of batches.

7.2 Value

Wilson Lawn WeedOut end-use products, containing *Phoma macrostoma* strain 94-44B, offer alternative products to conventional herbicides for the control of listed broadleaved weeds in turf, nursery crops, and ornamental plants and trees, especially where the use of conventional herbicides is not desirable or available.

The value information submitted is sufficient to support the following claims:

- A single pre-emergence application of a Wilson Lawn WeedOut end-use product provides control of broadleaf plantain, dandelion, scentless chamomile, wild mustard, common groundsel, and English daisy and suppression of white clover, Canada thistle, black medic, chickweed (partial), and common ragweed (partial).
- Two to three post-emergence applications of a Wilson Lawn WeedOut end-use product provides control of white clover and black medic and suppression of dandelion, Canada thistle, and broadleaf plantain.

8.0 Proposed Regulatory Decision

Health Canada's PMRA, under the authority of the *Pest Control Products Act* and Regulations, is proposing full registration for the sale and use of Bio-Phoma Technical Herbicide, the manufacturing concentrate, Bio-Phoma Manufacturing Concentrate, as well as three associated end-use products: Wilson Lawn WeedOut Ready-To-Use Bio-Phoma Herbicide, Wilson Lawn WeedOut Spot Weeder Bio-Phoma Herbicide and Wilson Lawn WeedOut Bio-Phoma Commercial, containing the technical grade active ingredient *Phoma macrostoma* strain 94-44B, to control a broad spectrum of broadleaf weeds in established turfgrass and new seeding of grasses and in field grown nursery and ornamental plants and trees and container grown ornamentals.

An evaluation of available scientific information found that, under the approved conditions of use, the product has value and does not present an unacceptable risk to human health or the environment.

List of Abbreviations

%	percent
CFU	colony forming unit
cm	centimetre(s)
EP	end-use product
g	gram(s)
m^2	squared metre(s)
MPCA	microbial pest control agent
MRL	maximum residue limit
NIOSH	National Institute for Occupational Safety and Health
PMRA	Pest Management Regulatory Agency
sal.	salicifolius
spp	subspecies
x	times

References

A. List of Studies/Information Submitted by Registrant

1.0 Chemistry

PMRA Document Number	Reference
2584743	2015, Manufacturing methods and quality assurance, DACO: M2.8 CBI
2584744	2015, Manufacturing methods and quality assurance - Appendix 1 - Bridging data, DACO: M2.8 CBI
2584745	2015, Potency estimation and product guarantee, DACO: M2.9.2 CBI
2584746	2015, Analysis for microbial contaminants, DACO: M2.10.2 CBI

2.0 Value

PMRA Document Number	Reference
1827382	2009, Report on profile of EP, DACO: M10.4.1.
1827383	2009, Report on MCPA performance, DACO: M10.3.2.1.
1827384	2009, Crop tolerance/pre-emergent field application, DACO: M10.3.1.
1827386	2009, Crop tolerance/post-emergent field application, DACO: M10.3.1.
1827388	2009, Phoma crop tolerance and efficacy in ornamentals, DACO: M10.2.1, M10.2.2, and M10.3.1.
1827390	2009, LER pre-emergent on dandelions, DACO: M10.2.1, and M10.2.2.
1827392	2009, LER pre-emergent on other weeds, DACO: M10.2.1, and M10.2.2.
1827395	2009, LER post-emergent on dandelion, DACO: M10.2.2.
1827397	2009, LER pre-emergent weed control in trees and forage grasses final, DACO: M10.2.2.
1827399	2009, LER pre-emergent on other weeds, DACO: M10.2.2.
1827401	2009, Spot treatment on dandelion, DACO: M10.2.2.
1827405	2009, Spot treatment on other weeds, DACO: M10.2.2
1827408	2009, Summary of efficacy and phytotoxicity, DACO: M10.1.
2584739	2015, Pre-emergent weed control of wild mustard, common ragweed, English daisy, chickweed, broadleaf plantain, and groundsel with *Phoma macrostoma* 94-44B, DACO: 10.2.3.3.